UNIVERSITI PUTRA MALAYSIA

ENHANCED OPEN SHORTEST PATH FIRST (OSPF) PROTOCOL USING PARALLEL TABU SEARCH – RING IN WIMAX MESH NETWORK

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By

BILAL ABDULHAQ AHMED

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

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Abstract of the thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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August 2013

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Wireless mesh networks (WMNs) considered as self – organized, self – configured networks, and easily deployed ad hoc networks. Many ad hoc routing protocols were applied to WMNs and many studies were conducted to analyse the functionality of such networks. Many studies have been done on ad hoc routing protocols in WIMAX environment especially OSPF due to its widely available in the real network implementation. However, there was no comparison been made between OSPF and other ad hoc routing protocols such as DSDV, and OLSR in WIMAX environment using mesh mode specifically in term of throughput, end to end delay, delivery ratio, and packet drop. As the technology of WIMAX using mesh mode is quite immature, this
study is aimed to investigate and compare the capability of OSPF with other ad hoc protocols in such technology environment. On the other hand, OSPF uses link bandwidth to assign the cost metric in an inversely proportional manner, while the delay is considered an important factor to determine the link cost. This study is intended to contribute for OSPF protocol optimization by presenting new cost function depend on both delay and bandwidth dedicated for WIMAX using mesh mode.

In this study a performance analyses has been made among Optimized Link State Routing (OLSR) protocol, Destination-Sequenced Distance Vector (DSDV) routing protocol, and an intra-domain link-state of Open Shortest Path First (OSPF). The analysis has been made under WIMAX environment using mesh mode. In our simulation, 10 to 50 mesh nodes were arranged in a mesh topology, with a working area of 500 meter x 500 meter. The transmission range of each node is 250 meters. The NS2 version 2.33 has been used as our simulator. It was found that the conventional OLSR has the worst performance when it’s compared to OSPF and DSDV in term of End to End delay, delivery ratio and drop ratio. The results showed the proposed extension of OSPF has better results than the conventional OSPF in terms of all the above parameters including the throughput.
Abstrak tesis ini dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

DIPERTINGKATKAN TERBUKA PATH TERPENDEK PERTAMA (OSPF) PROTOKOL MENGUNGGANKAN PARALLEL TABU SEARCH - RING IN WIMAX MESH RANGKAIAN

Oleh

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Rangkaian tanpa wayar mesh (WMNs) dianggap sebagai diri-teratur, diri-rangkaian konfigurasi, dan rangkaian mudah digunakan ad hoc. Ramai ad hoc protokol routing telah digunakan untuk WMNs dan banyak kajian telah dijalankan untuk menganalisis fungsi rangkaian itu. Banyak kajian telah dilakukan ke atas protokol ad hoc routing dalam persekitaran WiMAX terutama OSPF kerana didapati secara meluas dalam pelaksanaan rangkaian sebenar. Walau bagaimanapun, tidak ada perbandingan dibuat antara OSPF dan lain-lain protokol ad hoc laluan seperti DSDV, dan OLSR dalam persekitaran WiMAX menggunakan mod jaringan khusus dari segi pemprosesan, hujung ke hujung kelewatan, nisbah penghantaran, dan drop paket. Sebagai teknologi
WiMAX menggunakan mod jaringan agak matang, kajian ini bertujuan untuk mengkaji dan membandingkan keupayaan OSPF dengan lain-lain protokol ad hoc dalam persekitaran teknologi sedemikian. Sebaliknya, OSPF menggunakan pautan jalur lebar untuk memberikan kos metrik secara berkadar songsang, manakala kelewatan itu dianggap sebagai faktor penting untuk menentukan kos pautan. Kajian ini bertujuan untuk menyumbang untuk OSPF pengoptimuman protokol dengan mengemukakan fungsi kos baru bergantung kepada kedua-dua kelewatan dan jalur lebar khusus untuk WiMAX menggunakan mod jaringan.

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I certify that a Thesis Examination Committee has met on 19 August 2013 to conduct the final examination of Bilal Abdulhaq Ahmed on his thesis entitled "Enhanced Open Shortest Path First (OSPF) Protocol using Parallel Tabu Search – Ring in Wimax Mesh Network" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institutions.

BILAL ABDULHAQ AHMED ALMAHDAWI

Date: 19 August 2013
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